Maintenance & Repair Cost Calculation and Assessment of Resale Value for Different Alternative Commercial Vehicle Powertrain Technologies

evs30 The 30th International Electric Vehicle Symposium & Exhibition

October 9–11, 2017 Messe Stuttgart, Germany

Florian Kleiner*, Horst E. Friedrich, German Aerospace Center, Institute of Vehicle Concepts

*Corresponding author: Florian.Kleiner@dlr.de

Maintenance & Repair Cost Calucation

Methodology

- Bottom-up cost calculation
- 70 individually assessed components based on mean distance/time between failures (MDBF/MTBF)

Result

- Electrified powertrains with lower Maintenance & Repair costs
- If major components have to be replaced, benefits are expected to be overcompensated

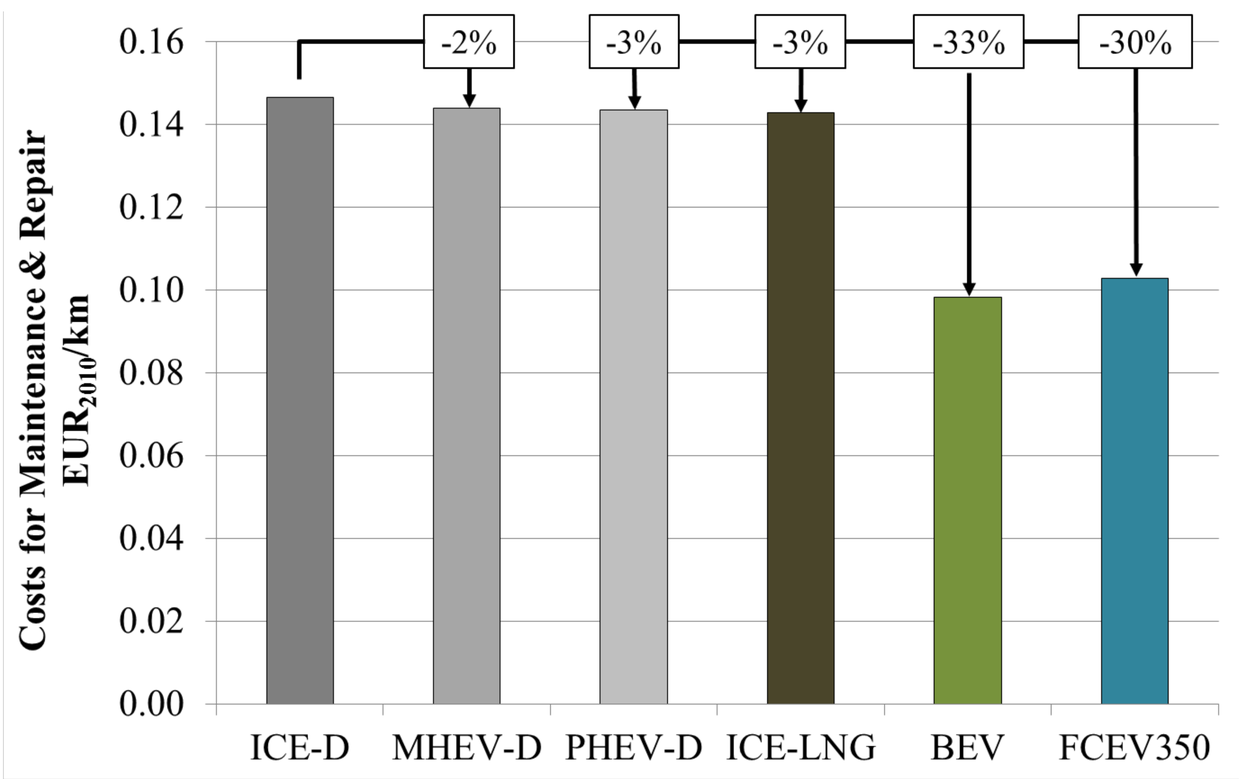

Figure : Tractor-trailer M&R cost comparison between different powertrain technologies (long-haulage application, 100.000 km yearly mileage)

Assessment of the Resale Value

Methodology

- Regression analysis based on market data
- Determination of a scale factor by means of the fuzzy logic considering the variables infrastructure density and technology maturity

Results

- The residual value can be determined as an exponential function
- Alternative powertrains show faster depreciation rates depending on the infrastructure density and the technology maturity

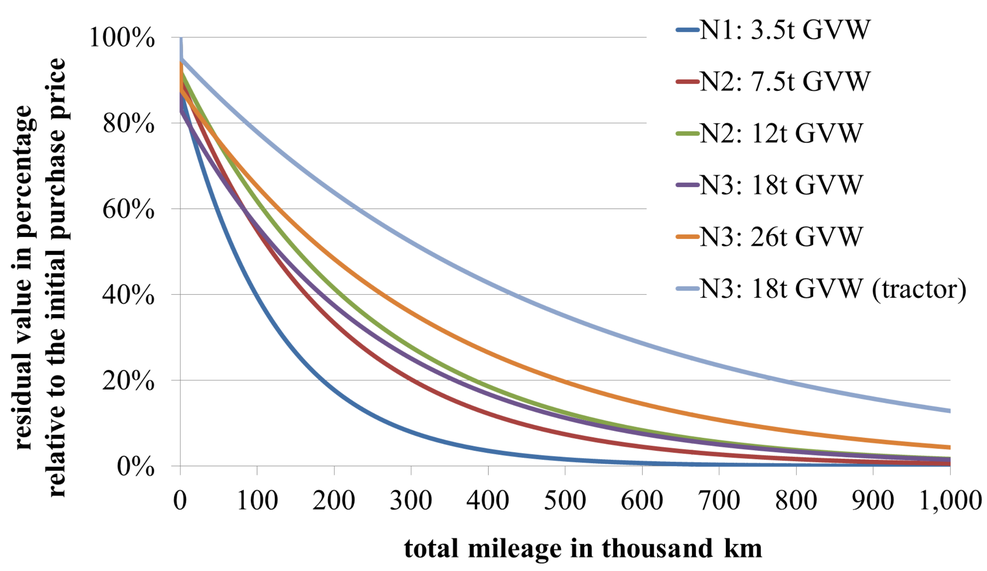

Figure: Development of the residual value of representative vehicle models

Table: Definition of the fuzzy variables infrastructure density and technology maturity

	ICE-D	MHEV-D	PHEV-D	ICE-CNG/ LNG	BEV	FCEV
Infrastructure density	very high	high	medium	low/ very low	medium	very low
Technology maturity	basic	key	pacemaker	key/key	pacemaker	pacemaker

Conclusion

- By the use of the Maintenance & Repair cost calculation methodology and the resale value approach required data in order to enable a holistic cost assessment for commercial vehicles can be provided

DLR Deutsches Zentrum für Luft- und Raumfahrt
German Aerospace Center

Institute of Vehicle Concepts